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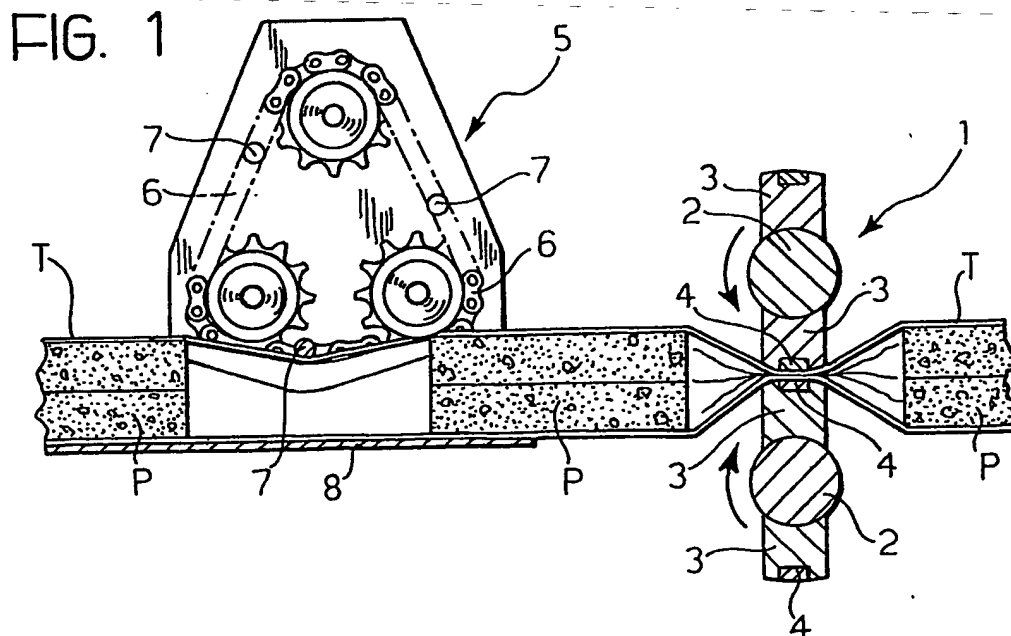
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GB 2250499 A GB 2236735 A EP 0237113 A1

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## (54) Avoiding displacement of products in form-fill-seal packaging

(57) In order to prevent the squashing action exerted by the unit (1) which closes the tubular wrapper (T), in which the products (P) being packaged advance, from causing the products (P) to slide backwards relative to the wrapper (T), the wrapper (T) is squashed upstream of each product (P) by finger-like formations (7) which act in the region of the wrapper (T) between successive products (P). The formations (7) are carried by a driven endless chain (6) of a device (5) which is adjustable in height to vary its squashing action.



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FIG. 1

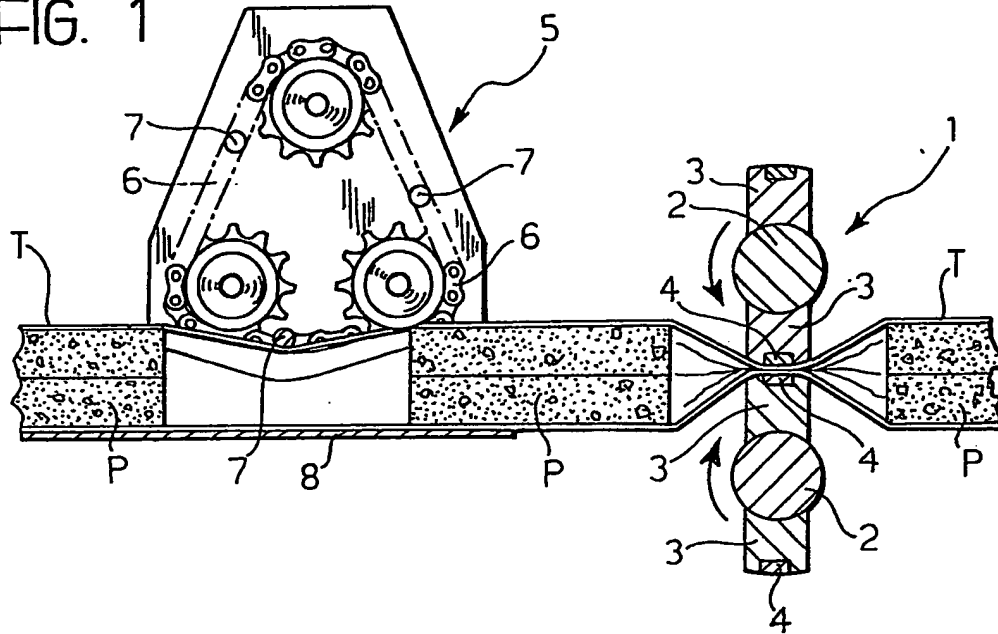
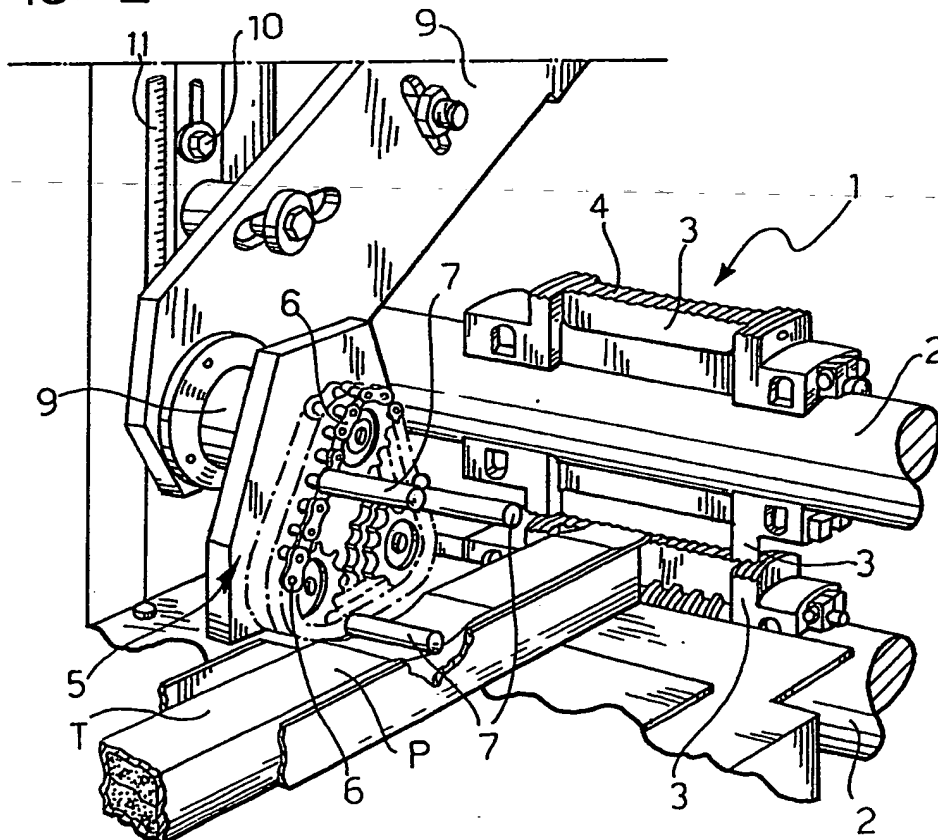


FIG. 2



A METHOD AND A DEVICE FOR CONTROLLING THE MOVEMENT OF  
PRODUCTS, PARTICULARLY FOR PACKAGING MACHINES

The present invention relates in general to packaging machines and, in particular, to machines in which the products being packaged are inserted in a tubular wrapper which is then squashed, closed and cut in the regions between successive products or groups of products, to form individual packages.

The squashing, closure and cutting of the tubular wrapper is effected in one or more closure stations in cascade. Each station usually includes two jaws which can perform a guillotine-like relative clamping movement or, according to the solution which is perhaps most widespread at the moment, two rotary devices, one above the other, on which the jaws for acting on the wrapper are mounted in corresponding angular positions.

Equipment of this type (currently known as "flow-pack", "form-fill-seal" or, briefly, FFS equipment) is described, for example in United States patents 4 862 673 and 4 955 184 in the name of the present Applicant.

With this equipment, particularly with fairly fast rates of operation and when the products being packaged are of a certain height (for example, piles of biscuits, crackers or similar food products) it is found, in use, that the jaw unit, which is closed in order to squash and close (and possibly cut) the tubular wrapper, has a certain tendency to push backwards slightly the product or group of products situated immediately upstream of the region of the wrapper which is being squashed.

This pushing action may displace the products being packaged so that they end up slightly upstream (in the direction in which the flow of products advance through the packaging machine) of their expected positions which are defined very precisely by metering and timing

units disposed upstream of the jaws. In some cases, this displacement leads to the formation of packages which do not correspond precisely to the expected quality and, in more serious cases, results in faulty positioning of the products which end up being "chewed" by the jaws which close in order to close the wrapper; clearly this is an undesirable operating condition which involves the need to stop the packaging machine immediately.

In order to combat this phenomenon, it has already been proposed to provide lateral restraint means for the wrapper (typically two pairs of motor-driven belts acting on the opposite sides of the wrapper) immediately upstream of the region in which the jaws act, for gently gripping the wrapper and the products within it and for preventing the relative sliding induced by the squashing action (the squish) exerted by the jaws situated immediately downstream.

This solution may be found really effective only with products having exactly- and precisely-defined lateral dimensions, which is hardly ever the case in reality, particularly when one is concerned with food products such as baked products, the dimensions of which may vary even within quite wide limits for various reasons (for example, different degrees of rising in the oven).

It has also been proposed to use vacuum (subatmospheric pressure) sources which can create a subatmospheric pressure in the wrapper so as to induce the tubular wrapper to adhere quite closely to the products within thus resisting, to a certain extent, the relative sliding induced by the squashing action of the jaws.

Leaving aside an evaluation of the effectiveness of this type of operation, it should be noted that the use of a vacuum source (in practice, a suction pump) within a packaging plant for, for example, food products, is

usually found to be very difficult because of the tendency for the suction pump to draw in the crumbs, bits, dust, etc., which are normally present in the surrounding atmosphere.

The object of the present invention is to provide a solution which can remedy the phenomenon described above in a safe and reliable manner without inducing the possible disadvantages of the solutions of the prior art mentioned above.

According to the present invention, this object is achieved by virtue of a method and a device having the specific characteristics recited in the following claims.

The present invention provides a method of controlling the movement of products in a packaging machine in which a flow of the products advances, wrapped in a tubular wrapper, towards at least one closure unit which is intended to squash the wrapper in the spaces between successive products in the flow, characterised in that it includes the step of providing means for squashing the wrapper which can squash the wrapper in at least one space between successive products in the flow, upstream of the closure unit, so that, when the tubular wrapper is closed by the closure unit, the products are simultaneously subjected to: a squashing action on the wrapper by the closure unit downstream of the product, and a squashing action on the wrapper by the squashing means upstream of the product, so that the product remains in its position, relative to the wrapper.

The invention will now be described, purely by way of non-limiting example, with reference to the appended drawings, in which:

Figure 1 is a side elevation of part of a packaging machine formed according to the invention, and

Figure 2 is a perspective view of the machine of Figure 1.

The drawings show the or a station for closing the wrapper in a packaging machine of the type currently known as a "flow-pack" or "form-fill-seal" machine.

As already stated, the general characteristics of such a machine may be considered widely known in the art and such as not to require a detailed description herein; in this connection, reference may be made, for example, to the two United States patents cited in the introduction to the present description.

For the purposes of an understanding of the present invention, it suffices to bear in mind that a machine of the type specified above is intended to process a continuous flow of products P (advancing from left to right with reference to the viewpoint of Figure 1), which are constituted - in the embodiment illustrated - by piles of food products such as biscuits, for example, two or three superposed biscuits of a certain thickness.

Upstream of the closure station shown, which is generally indicated 1, the products P have been inserted in a tubular wrapper T constituted by a film of transparent plastics material, or of aluminium covered with a heat-sealable material on its inner face, etc.

In particular, the products P are inserted in the tubular wrapper T in positions (and hence at distances apart) which are determined precisely in a manner correlated ("in phase") with the operation of the closure unit. This is in accordance with widely known criteria which do not need to be recited herein.



In the embodiment illustrated, the unit 1 is constituted by two contrarotating devices, one above the other, each constituted by a motor-driven shaft 2 on which two (or more) operative members or jaws 3 are mounted in equiangularly spaced positions. As a result of the rotary movement of the shafts 2, the jaws perform orbital movements which cause them to be lowered (in the case of the upper jaws) and raised (in the case of the lower jaws) relative to the homologous members of the other device so as to give rise to a net movement towards and away from each other due to the synchronisation of the rotary movement of the two shafts 2 (which are usually connected by a gearing, not shown). This movement is intended to squash the wrapper T as a result of the closure of the jaws 3 in the regions separating two consecutive products P.

The tips of the jaws 3 also carry heating elements 4 (with resistors, not shown) for locally heat-sealing the material of the wrapper T clamped between the jaws, so as to close it as a result of the formation of a transverse seal in the wrapper T.

The operating temperature of the elements 4 and their shapes (for example, like blades) may also result in the cutting of the transverse seal thus formed and the consequent formation of separate packages each containing a separate product or group of products.

There is also equipment (such as that described in United States patent 4 862 673) having two closure units 1 in cascade, of which the first squashes and heat-seals the wrapper and the second strengthens the seal and then effects the cutting action.

As stated, the object of the invention is to prevent

the squashing of the wrapper T, as a result of the closure of the unit 1, from resulting in pressure on the product or products P situated immediately upstream causing the products to move backwards, with reference to the direction of advance of the packaging machine; in the embodiment to which Figure 1 relates, the products P advance from left to right and the squashing action is such as to cause the products P to return towards the left.

In the solution according to the invention, this problem is eliminated with the use of the device generally indicated 5. This device is constituted essentially by a motor-driven endless chain or pair of chains 6 with a generally triangular path of movement (this shape is not binding, however). In particular, the path has a straight lower pass which extends along the path along which the products P and the wrapper T advance towards the closure unit 1, preferably slightly below the upper plane defined by the wrapper T covering the products P.

As can better be seen in the perspective view of Figure 2, the chain or chains 6 are mounted beside the path along which the tubular wrapper T and the products P therein advance. One or more fingers 7 mounted on the chains 6 project towards the path of movement of the tubular wrapper T and the products P, and interfere therewith.

The positions in which the fingers 7 are mounted on the chains 6 are selected so that their spacing (measured along their path of movement) corresponds substantially to the overall lengths of the packages to be formed.

The chain 6 is driven by a transmission 9 which is driven, by means of transmission elements (not shown), by the same motor unit which drives the jaws 1. The movement of the chain 6 is synchronised with the movement of advance of the tubular wrapper T so that, when the machine is in operation, each finger 7 travels along the lower straight pass of its path of movement at a speed equal to that at which the products P advance on a lower sliding plane 8, in a position corresponding to the space within the tubular wrapper T which is left empty between two successive products or groups of products P.

Each finger 7 thus squashes the tubular wrapper T, lowering it slightly behind each product or group of products P, as shown schematically in Figure 1.

The degree of squashing achieved will naturally depend upon the height of the lower pass of the chain 6 relative to the lower plane 8 on which the products P advance (with the interposition of the lower portion of the tubular wrapper T).

Naturally, the squashing effect will also depend on the positions in which the fingers 7 are mounted on the chains 6. In the embodiment illustrated, the chains in question are normally chains with links and the fingers 7 are constituted simply by cylindrical bars mounted on the axes of respective links of the chain.

However, this selection should not be interpreted in a binding sense.

In any case, in order to put the invention into effect

correctly, it is important that, during their movement along the lower pass of their path, the fingers 7, or more precisely, their lower surfaces or generatrices, are at a height (naturally, with reference to the sliding plane 8) at least slightly below the height of the upper surface of the tubular wrapper T which is wrapped around the products.

Naturally, the term "at least slightly below" in connection with the intensity of the squashing action on the wrapper T relates to various factors and, first and foremost, to the overall heights of the products or groups of products P. The maximum possible lowering movement of the fingers 7 is in any case usually substantially less than half the height of a product P or a group of products P. In fact, if the fingers 7 were to be lowered by such a distance (which would be equal to the downward travel of the jaws which are clamped together) it could, in fact, be considered that, instead of being beneficial, their intervention might end up causing further operating problems.

In any case, the ideal operating condition can be selected by the user from time to time in dependence on the specific requirements of the process.

For this purpose, as can better be seen in Figure 2, the device 5, together with its transmission 9, is mounted on a bracket or equivalent support 9a which is mounted on the framework of the machine in an adjustable manner, for example, with the interposition of adjustment means, such as a clamping screw 10, which can be slackened so that the unit constituted by the bracket 9a and the device 5 mounted thereon can slide vertically and their displacement relative to a

graduated scale 11 can be adjusted until the optimal operating conditions are found.

Thus, the operation of the present invention is based on a solution in which the fingers 7 exert a squashing action on the wrapper, upstream of each product or group of products P, which is complementary to the squashing action effected downstream by the jaws of the closure unit 1.

In other words, each product or group of products P arriving immediately upstream of the unit 1 tends to be urged backwards (thus being displaced slightly upstream relative to the wrapper T) by the squashing action of the unit 1 which closes to grip the wrapper T; at the same time, the product or group or products P is subjected to a force of the same kind but of a lesser magnitude, this time exerted upstream by the finger 7 which follows the forward movement of the product P along the plane 8 and thus has a squashing effect such as to urge the product or group of products P forwards displacing it slightly downstream, relative to the wrapper T. Since the two squashing actions and the forces resulting therefrom act on opposite sides they cancel out so that the product or group of products P remains exactly in the position, relative to the tubular wrapper T, assigned to it by the metering and timing members situated upstream of the packaging machine.

Thus, the problems mentioned in the introduction to the present description are eliminated.

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CLAIMS

1. A method of controlling the movement of products (P) in a packaging machine in which a flow of the products (P) advances, wrapped in a tubular wrapper (T), towards at least one closure unit (1) which is intended to squash the wrapper (T) in the spaces between successive products (P) in the flow, characterised in that it includes the step of providing means (7) for squashing the wrapper (T) which can squash the wrapper (T) in at least one space between successive products (P) in the flow, upstream of the closure unit (1), so that, when the tubular wrapper (T) is closed by the closure unit (1), the products (P) are simultaneously subjected to:

- a squashing action on the wrapper (T) by the closure unit (1) downstream of the product (P), and

- a squashing action on the wrapper (T) by the squashing means (7) upstream of the product (P), so that the product (P) remains in its position, relative to the wrapper (T).

2. A device for controlling the movement of products (P) in a packaging machine in which a flow of the products (P) advances, wrapped in a tubular wrapper (T), towards at least one closure unit (1) which is intended to squash the wrapper (T) in the spaces between successive products (P) in the flow, characterised in that it includes means (7) for squashing the wrapper (T) which can squash the wrapper (T) in at least one space between successive products (P) in the flow, upstream of the closure unit (1), so that, when the tubular wrapper (T) is closed by the closure unit (1), the products (P) are simultaneously

subjected to:

- a squashing action on the wrapper (T) by the closure unit (1) downstream of the product (P), and

- a squashing action on the wrapper (T) by the squashing means (7) upstream of the product P, so that the product (P) remains in its position, relative to the wrapper (T).

3. A device according to Claim 2, characterised in that the squashing means (7) are constituted by pressure formations (7) which can perform a movement substantially coextensive and synchronous with the path of advance of the products (P) and the tubular wrapper (T), upstream of the closure unit (1).

4. A device according to Claim 2 or Claim 3, characterised in that the squashing means include fingers (7) which can squash the wrapper (T).

5. A device according to any one of the preceding Claims 2 to 4, characterised in that the squashing means (7) include pressure formations (7) carried by a body (6) which is movable along a generally endless path having a pass which is substantially coextensive with the path of movement of the products (P) and the tubular wrapper (T).

6. A device according to any one of the preceding Claims 2 to 5, characterised in that the intensity of the squashing action exerted on the tubular wrapper (T) by the squashing means (7) can be varied selectively (10, 11).

7. A device according to Claim 5 and Claim 6, characterised in that it includes means (10, 11) for selectively varying the height of the path of movement of the pressure formations (7) relative to the plane (8) of movement of the products (P).

8. A device according to Claim 5, characterised in that the movable body is constituted by one or more motor-driven chains.

9. A method of controlling the movement of products in a packaging machine substantially as hereinbefore described with reference to the accompanying drawings.

10. A device for controlling the movement of products in a packaging machine substantially as hereinbefore described with reference to the accompanying drawings.



**Patents Act 1977**  
**Examiner's report to the Comptroller under**  
**Section 17 (The Search Report)**

-13-

Application number

GB 9304771.0

**Relevant Technical fields**

(i) UK Cl (Edition L ) B8C (CW17)

(ii) Int Cl (Edition 5 ) B65B 9/06

**Search Examiner**

S R SMITH

**Databases (see over)**

(i) UK Patent Office

(ii)

**Date of Search**

1 APRIL 1993

Documents considered relevant following a search in respect of claims 1 TO 10

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
P, X	GB 2250499 A (IBARAKI) - see seal bars 25, 26 and tube 18 squashed by suction upstream of a product 10	1, 2
X	GB 2236735 A (IBARAKI) - see lines 12 to 20 of page 6, Figures 1 and 7	1, 2, 3, 5
X	EP 0237113 A1 (MATCO) - see lines 4 to 10 of page 8 and lines 7 to 23 of page 9	1, 2, 3

-14-

Category	Identity of document and relevant passages	Relevant to claim(s)

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